

Name _____ Date _____ Class _____

Genetics: The Science of Heredity • Guided Reading and Study

Mendel's Work

This section describes how Gregor Mendel identified the method by which characteristics are passed from parents to their offspring.

Introduction

- Gregor Mendel experimented with hundreds of pea plants to understand the process of _____.

Match the term with its definition.

Term

- heredity
- genetics
- traits

Definition

- The scientific study of heredity
- Physical characteristics
- The passing of traits from parents to offspring

Mendel's Experiments

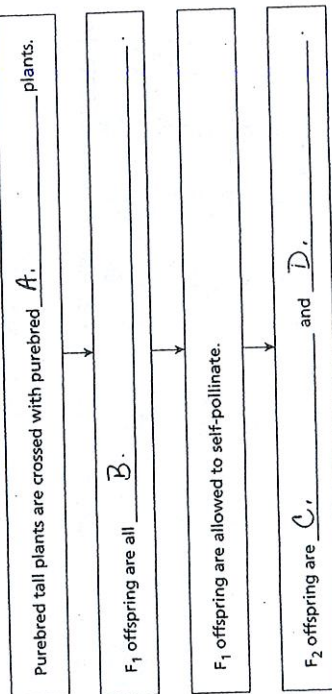
- In a flower, the female sex cells, or eggs, are produced by the _____.

- What are purebred organisms?

Genetics: The Science of Heredity

- Complete the flowchart below, which summarizes Mendel's first experiment with pea plants.

Mendel's Experiment



- Circle the letter of other traits in garden peas that Mendel studied.
 - seed size, seed shape, seed color
 - seed color, pod color, flower shape
 - flower size, pod shape, seed coat color
 - pod color, seed shape, flower position
- Two forms of the trait of seed shape in pea plants are _____ and _____.

Dominant and Recessive Alleles

- Circle the letter of each sentence that is true about alleles.
 - Recessive alleles are never present when dominant alleles are present.
 - Alleles are different forms of a gene.
 - A trait controlled by dominant alleles always shows up in the organism when the allele is present.
 - Recessive alleles hide dominant alleles.
- Is the following sentence true or false? Only pea plants that have two recessive alleles for short stems will be short. _____

Match the pea plant with its combination of alleles.

Pea Plant

Combination of Alleles

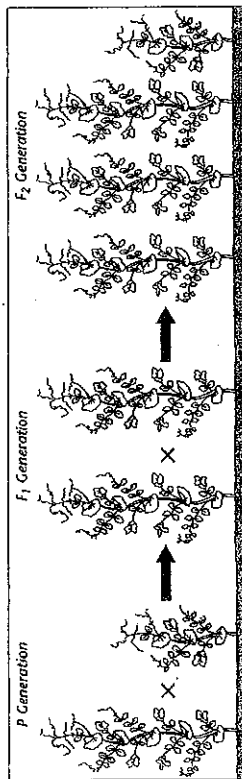
- | | | |
|-------|--------------------|-------------------------------------------------------------|
| _____ | 12. purebred short | a. Two alleles for tall stems |
| _____ | 13. purebred tall | b. One allele for tall stems and one allele for short stems |
| _____ | 14. hybrid tall | c. Two alleles for short stems |

- A dominant allele is represented by a(n) _____ letter.
- A recessive allele is represented by a(n) _____ letter.
- How would a geneticist write the alleles to show that a tall pea plant has one allele for tall stems and one allele for short stems? _____
- Is the following sentence true or false? Some scientists during Mendel's time thought Mendel should be called the Father of Genetics. _____

Mendel's Work

Understanding Main Ideas

Study the diagram. Then answer the following questions on a separate sheet of paper.



19. What trait in pea plants is being studied in the cross above?
20. What are the two alleles of this trait?
21. Which allele is the dominant allele? Explain how you know.
22. Which allele is the recessive allele? Explain.
23. What alleles do the F₁ offspring have? Explain which allele was inherited from which parent.

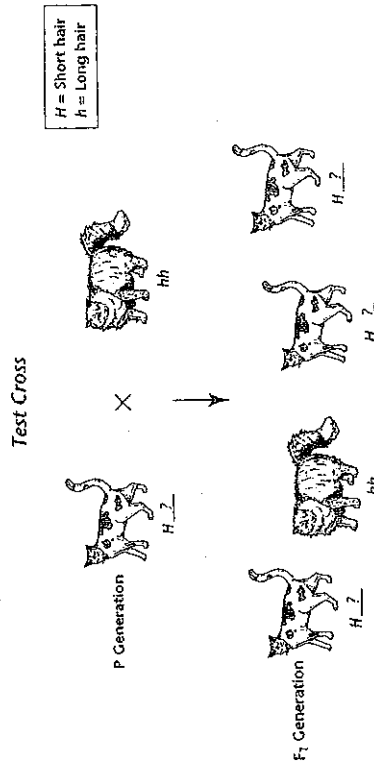
Building Vocabulary

Match each term with its definition by writing the letter of the correct definition on the line beside the term.

- | | |
|------------------------|-------------------------------------------------------------------------|
| _____ genetics | a. the passing of traits from parents to offspring |
| _____ alleles | b. an organism with two different alleles for a trait |
| _____ traits | c. factors that control traits |
| _____ recessive allele | d. physical characteristics of organisms |
| _____ genes | e. an allele whose trait always shows up in the organism |
| _____ hybrid | f. the different forms of a gene |
| _____ heredity | g. the scientific study of heredity |
| _____ dominant allele | h. an allele whose trait is masked in the presence of a dominant allele |

The Test Cross

When an organism has a trait controlled by a dominant allele, it can either be a hybrid or a purebred. To find out which, geneticists can use a test cross. In a test cross, the organism with the trait controlled by a dominant allele is crossed with an organism with a trait controlled by a recessive allele. If all offspring have the trait controlled by the dominant allele, then the parent is probably a purebred. If any offspring has the recessive trait, then the dominant parent is a hybrid. Study the test cross below, then answer the questions.



Answer the following questions on a separate sheet of paper.

25. Is the long-haired cat in the P generation a hybrid or a purebred? Explain your answer.
26. Is the short-haired cat in the P generation a hybrid or a purebred? Explain your answer.
27. If the short-haired cat in the P generation were purebred, what would you expect the offspring to look like?
28. In horses, the allele for a black coat (B) is dominant over the allele for a brown coat (b). A cross between a black horse and a brown horse produces a brown foal. Is the black horse a hybrid or a purebred? Explain.
29. In guinea pigs, the allele for a smooth coat (S) is dominant over the allele for a rough coat (s). Explain how you could find out whether a guinea pig with a smooth coat is a hybrid or a purebred.

** You may need to create a Punnett square to solve these.*